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Great Lakes Water Quality Board. Report to the International Joint Commission on Great Lakes Water Quality 1980. Summary

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Report to the International Joint Commission

1980 Report on Great Lakes Water Quality

Summary

Preface

This document contains the summary and recommendations from the 1980 report of the Water Quality Board to the International Joint Commission, as well as selected background information.

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Summary and Recommendations

INTRODUCTION

With this 1980 Report, the Board is providing the International Joint Commission with a brief status report on the health of the Great Lakes ecosystem, an update on jurisdictional programs to meet the requirements of the 1978 Agreement, and a perspective on the current and future actions the Board is undertaking to evaluate the effectiveness of such programs. The first Biennial Report as called for by the 1978 Agreement will be submitted in 1981.

ENVIRONMENTAL PROBLEMS

Throughout this report, the Great Lakes Water Quality Board draws attention to the two major environmental problems identified in the 1978 Agreement: toxic substance contamination and accelerated eutrophication. The Board considers these problems to be "whole lake" in nature since each affects all the lakes in varying degrees of severity and intensity. Yet each "problem" has its own unique characteristics and its own potential to adversely affect the chemical, physical and biological balance of the lakes.

Control technologies to abate these problems likewise vary greatly, not only in terms of their maturity, but also in terms of their applicability. For example, to address the problem of accelerated eutrophication, programs to control direct phosphorus discharges from major municipal plants are considered technically feasible and are in place or planned. Yet, achievement of the 1 mg/L phosphorus effluent limitation in the Lower Great Lakes still varies among the jurisdictions. Conversely, programs to control the input of toxic substances into the Great Lakes are highly complex as they must be designed to control not one substance, but potentially thousands with often drastically different properties and arising from numerous air, water and land sources.

With that perspective, the Board presents a status report on the response of the Great Lakes ecosystem to phosphorus and toxic substance control measures. The report also discusses the atmosphere as a critical pollutant source, the role of surveillance, problem areas, objectives, and data quality and quantity concerns.

TOXIC SUBSTANCES CONTROL

Public concern over the pervasive nature of toxic chemical pollution and its potential to adversely affect the health and well being of both aquatic and terrestrial species (including man) within the Great Lakes System has been the driving force for numerous past recommendations to the IJC from both the Water Quality and Science Advisory Boards. In response, the Parties as well as the jurisdictions have undertaken numerous legislative and programmatic initiatives. The Board has directed its newly created Toxic Substances Committee to undertake a substantive evaluation of these current and planned toxic substance control programs to determine what progress has been made by the Parties in fulfilling the requirements of Annex 12 of the Agreement, as well as to identify deficiencies in these programs so that corrective legislative or regulatory actions can be initiated.

The Toxic Substances Committee has prepared an Interim Report to the Board which recommends a management framework for evaluating toxic substance control programs. As a first step in this evaluation, the Committee has compiled detailed information on applicable legislation and programs and is proceeding with its assessment. The Interim Report also displays the tasks which must be completed for presentation in the 1981 Biennial Report. The Board is aware that such an evaluation is a complex and time-consuming undertaking which will require extensive cooperation and participation by the jurisdictions if it is to be successful. It also notes, for evaluation purposes, that toxic substance control measures cannot easily or wisely be separated from overall pollution control programs. The Board offers, as only one example of such complexity, the fact that its Committee has already identified over 200 data information systems currently operational within the basin.

> *The Board does conclude that there is evidence that the Great Lakes ecosystem is responding to the controls already in place.*

For example, substantial reductions in organochlorine residues have been found in small fish from Lakes Ontario and Erie. Similarly PCB, DDT and mirex residues declined in herring gull eggs from both lower lakes in 1979. Declines are also reported for herring gull eggs from Lake Huron and Lake Michigan while declines in eggs from Lake Superior were not as significant as from the other lakes. These declines represent decreased loads of contaminants into the ecosystem.

The Board cautions, however, that these declines should not be interpreted to mean that all necessary controls have been implemented.

> *In particular, the Board is concerned about the pollutants which enter the system via the atmosphere.*

For example, recent studies indicate that atmospheric inputs of PCBs represent a significant portion of the total input from all sources for Lakes Superior, Michigan and Huron.

> *The Board is equally concerned about the hazardous waste disposal issue and the lack of public acceptance for the siting of such facilities.*

EUTROPHICATION

Programs to control phosphorus inputs and hence abate accelerated eutrophication, particularly in the Lower Lakes, have been the corner stone of both the 1972 and 1978 Agreements. The lakes have responded to those control programs in the following manner:

Total and soluble phosphorus concentrations declined significantly in the Detroit River between 1968 and 1979. Total phosphorus loads to Lake Erie have declined from over 90,000 kg/d in 1968 to approximately 14,000 kg/d in 1979 (a decrease of 84%) due largely to the implementation of phosphorus control programs in Detroit.

Total phosphorus levels decreased slightly in Lake Ontario in 1979 as compared with 1978 levels. In the nearshore areas between the Niagara River and Oshawa, significant downward trends in phosphorus levels were measured between 1967 and 1979, as a result of control programs implemented on the Canadian side.

Programs to limit discharge of phosphorus to 1 mg/L (as recommended by the Water Quality Board in 1976) at municipal plants on the Upper Lakes are also underway. Significant declines of municipal phosphorus discharges into all three upper lakes have been observed and are displayed in the section on Municipal Phosphorus Control.

But the Board notes that there still remains a number of municipal treatment plants on Lakes Erie and Ontario which are not yet achieving 1 mg/L and which have the potential to exceed the compliance deadlines of the 1978 Agreement.

> *The Board strongly recommends that the IJC urge the Governments to increase their efforts to ensure that these plants meet their target effluent loads. Because phosphorus loads still exceed the targets, the Board also recommends, as it has in the past, that a phosphate detergent limitation be adopted for those portions of Ohio and Pennsylvania within the Great Lakes Basin to assist in reducing phosphorus loads.*

In contrast to the plants which are not yet meeting their phosphorus target loads, the Board wishes to acknowledge and highlight the success of those municipalities on the lakes which have not only achieved 1 mg/L but which have in many cases consistently performed below 1 mg/L. A list of such plants is contained in the Appendix.

SURVEILLANCE

> *The Board recommends that the IJC accept the Great Lakes International Surveillance Plan, as revised and published in November 1980, as satisfying the requirements of Annex 11 of the Agreement.*

The Board makes this recommendation with the strong conviction that the Plan is, and must continue to be, viewed as a framework within which programs can and should be modified to address changing priorities and new environmental conditions.

> *The Board further concludes that the Great Lakes surveillance findings have had an impact on remedial programs and are necessary and essential to evaluate the effectiveness of control measures.*

PROBLEM AREAS

The Board has for several years reported to the IJC on specific geographic areas within the Great Lakes Basin which do not meet Agreement objectives

and/or jurisdictional standards. Within this report, the Board updates the 1978 Problem Area list with the addition of three new areas in Michigan: Munising beach, Marquette beach and White Lake.

The Board wishes to advise the Commission that it will present a new perspective on Great Lakes environmental problems in the 1981 Biennial Report. This new approach will take into account the increase from 8 to 41 in specific objectives, as well as the "ecosystem" or "whole lake" emphasis contained in the 1978 Agreement.

OBJECTIVES

During 1980, the Board undertook an analysis of Agreement Specific Objectives and their impact on jurisdictional standards or objectives.

> *The Board is pleased to report that this review found that Agreement Objectives have had a decided impact on the water quality standards and objectives adopted by both Canadian and United States jurisdictions.*

DATA QUALITY AND QUANTITY

The basis for most of the information contained in this report and previous Board reports is the data collected and analyzed by the jurisdictions and the private sector scientific community. The quality and accuracy of that data is critical for evaluating progress under the Agreement, for determining compliance with regulations, and for making multi-million dollar control program decisions.

> *The Board wishes to again advise the IJC of the increasing resource constraints on all jurisdictions in the areas of analytical capacity and capability.*

The ever spiralling demands for complex organic analyses, sophisticated equipment and skilled staff must be met or it will become increasingly more difficult to provide timely and accurate information and control programs will be hindered.

> *The Board also concludes that the assessment of Great Lakes laboratory performance is an essential part of the international surveillance program and it recommends that additional resources be assigned by all jurisdictions to quality assurance programs, including the interlaboratory comparison effort.*

And finally, the Board wishes to alert the Commission that present procedures within the Windsor Regional Office for handling the enormous amounts of compliance and ambient water quality information appear to be less than adequate. The Board is reviewing the matter and will be forwarding its recommendations in the near future.

1978 AGREEMENT

The Board outlines in the Agreement Progress section the progress of the Parties in establishing programs to fulfill the objectives of the international Agreement. It also highlights some of the significant pollution control issues and abatement program progress.

Aquatic Ecosystem Quality

In keeping with the ecosystem concept adopted in the 1978 Great Lakes Water Quality Agreement, this section summarizes, on a lake by lake basis, water quality issues as they relate to sediments, air and biota. Eutrophication is evaluated in terms of indicators of accelerated eutrophication brought about by man-induced additions of nutrients, particularly phosphorus. Contaminants are discussed with particular emphasis on toxic substances and are expressed as organic or inorganic residues not normally found in the system. An update on whole lake water quality problems and specific local problem areas is also provided.

BASIN OVERVIEW

The Water Quality Board, recognizing eutrophication and contamination to be the key concerns in the Great Lakes aquatic ecosystem, established these issues as highest priority in the implementation of the Great Lakes International Surveillance Plan. From surveillance programs implemented in 1979, the following represent the more significant findings:

CONTAMINANTS

General indications of declines of PCB, DDT and DDE have been found in fish and gull populations throughout the basin, indicative of decreased exposure of the biological community. In past reports, the Board noted newly identified compounds in the Great Lakes System. Although no new compounds were reported this year, systematic, annual scans of fish and gull eggs will continue in order to provide an early warning of the occurrence of contaminants in the basin and specific localities within it.

There has been a substantial decrease in the concentrations of organochlorine residues in a variety of species of small fish of Lakes Ontario and Erie. Declines in PCB concentrations have ranged between 22% and 89% in Lake Ontario fish samples and 60% and 89% in Lake Erie fish samples. The general nature of this decrease in a variety of fish species implies a decrease in input of organochlorides to the system.

Similarly PCB, DDT and mirex residues declined in herring gull eggs from both lower lakes during 1979. Declines are also reported for Lake Huron and Lake Michigan, although declines in Lake Superior were not as significant as in the other lakes. These declines also represent decreased inputs of contaminants to the Great Lakes.

EUTROPHICATION

Although the non-conservative nature of phosphorus and its extensive interaction with biological populations make it very difficult to determine the impact of controls, there are areas such as the Bay of Quinte, Detroit River and north shore of western Lake Erie, and Saginaw Bay where point source controls have markedly affected the water quality of receiving waters.

Total phosphorus levels in Lake Ontario decreased slightly in 1979, thus continuing the trend of declining levels observed over the last decade for the whole lake. Phosphorus levels in the Toronto nearshore, though higher in 1978, are consistent with the long term decreasing trend.

The long term decline in phosphorus concentrations in the Toronto-Hamilton-Niagara River shore zone of Lake Ontario measured over the past decade is impressive. For instance, total phosphorus measured in Toronto Inner Harbour has decreased from 88 µg/L in 1968 to 28 µg/L in 1978 as a result of remedial measures.

Total and soluble phosphorus concentrations declined significantly in the Detroit River between 1968 and 1979. Total phosphorus loads to Lake Erie have declined from over 90,000 kg/d in 1968 to approximately 14,000 kg/d in 1979 largely because of the implementation of phosphorus control programs in Detroit.

PROBLEM AREAS

With the signing of the 1978 Water Quality Agreement, the number of specific objectives on which problem areas are based were increased from 8 to 41. The nature of the additional specific objectives is such that the Board plans to reassess the problem area concept to consider systematic whole lake problems. The Board will present a new perspective on Great Lakes environmental problems in the 1981 Biennial Report to the Commission.

In 1979, three new problem areas were identified by the Michigan Department of Natural Resources. Two problem areas on Lake Superior have been reported at Munising and Marquette beaches because fecal coliform and total coliform objectives were exceeded. A new problem area was also identified on Lake Michigan, at White Lake, because of elevated levels of chlorinated hydrocarbons in water, fish and in sediments.

A problem area reported earlier by the Water Quality Board in Lake Ontario at the Bay of Quinte has responded significantly to eutrophication controls. Levels of phosphorus have declined in this area resulting in decreased chlorophyll, turbidity and decreased time where micro strainers were required at the Belleville Water Treatment Plant. Nevertheless, dissolved oxygen may remain at depressed levels for some time because of the long residence time of waters in the Bay of Quinte area.

Municipal Phosphorus Control

The principal requirement of the 1972 Agreement with respect to eutrophication was the control of point sources of phosphorus in the Lower Lakes by 1975. The International Joint Commission recommended to the Governments in September 1976 that the 1 mg/L effluent limitation on all point source discharges of phosphorus be extended throughout the entire Great Lakes System.

Pollution abatement programs implemented in both countries to control phosphorus discharges include: municipal sewage treatment plant construction with phosphorus removal facilities for plants discharging more than 3800 m^3/d or 1 MGD to the Lower Lakes, detergent phosphorus limitations in all jurisdictions except the states of Pennsylvania and Ohio, and control of industrial sources. The Board recommends to the International Joint Commission that a phosphate detergent limitation be adopted for those portions of Ohio and Pennsylvania within the Great Lakes Basin to assist in achieving target loads to Lake Erie.

LOWER LAKES

Municipal phosphorus loads in 1979 to Lakes Erie and Ontario are substantially lower than the 1972 load estimates (Table 5). Canada was below the 1 mg/L target for Lake Erie and slightly exceeded the target for Lake Ontario. The United States loads have decreased substantially but still greatly exceed the target loads for both lakes. Decreased municipal loads to Lake Erie are primarily a result of phosphorus control programs at Detroit which account for 78% of this loading decrease.

Table 6 shows the phosphorus control performance of municipal treatment plants discharging more than 38,000 m^3/d (10 MGD). These are the largest plants in the Lower Lakes basin and are responsible for most of the municipal phosphorus load to these lakes. Of this group, twelve out of twenty-seven United States plants and twelve out of nineteen Canadian plants discharged phosphorus at or below 1.0 mg/L. Table 7 identifies the largest sources of excess municipal phosphorus loads to the Lower Lakes. The estimated completion dates for these and other facilities in some cases extend beyond the December 31, 1982 Agreement date. Phosphorus discharge at 1 mg/L or less basinwide is unlikely before all major construction is completed.

The level of compliance of all municipal dischargers in the Lower Lakes with the 1.0 mg/L target can be found in the Appendix. The Water Quality Board notes that a number of municipalities are doing significantly better than the 1.0 mg/L requirement for the Lower Lakes. The facilities in both Upper and Lower Lakes discharging less than 1 mg/L of phosphorus are listed in the Appendix.

UPPER LAKES

While the 1972 Agreement did not require controls for phosphorus discharges to the Upper Lakes, the Water Quality Board in 1976 recommended the 1.0 mg/L phosphorus effluent limitation for municipalities discharging 3800 m^3/d (1 MGD). All United States jurisdictions require this level of treat-

ment. The Province of Ontario has imposed an 80% removal requirement on larger facilities. Table 8 displays the phosphorus removal performance of the treatment plants discharging 38,000 m^3/d (10 MGD) or more in the Upper Lakes. These are the largest plants in the Upper Lakes basin and discharge most of the municipal phosphorus load to the Upper Lakes. Muskegon County's land application system performance is particularly noteworthy. Treated effluent from the system averaged 0.06 mg/L total effluent phosphorus in 1979.

Agreement Progress

The 1978 Water Quality Agreement commits the United States and Canadian Governments to develop and implement programs and other measures to fulfill the purpose of the Agreement. This chapter reviews the progress made in compliance with the Agreement and discusses highlights and significant developments in program implementation.

COMPLIANCE WITH AGREEMENT DATES

The 1978 Great Lakes Water Quality Agreement specified dates or time intervals by which certain actions should be accomplished. Table 11 lists those paragraphs in the Agreement which contain time constraints and describes the progress made toward completion of the activities by Governments.

Progress has been made in meeting the requirements for major programs, such as industrial and municipal controls. These programs were underway in compliance with the 1972 Agreement. Programs such as controls on nonpoint sources and toxic substances were not a part of the 1972 Agreement but are required by the 1978 Agreement, and while some progress has been made, the programs are still in the early stages of development at this time.

Two major programs, Annex 2 - Limited Use Zones and Annex 3 - Control of Phosphorus, were not completed by the dates specified in the Agreement. The Parties have not submitted annual reports as required by Annex 2 of the Agreement.

In an exchange of notes between Canada Department of External Affairs and the United States Department of State on September 1980, the timetable for completion of confirmation of future phosphorus loads and establishment of compliance schedules as specified in Annex 3 has been extended one year, until May 1981.

POINT SOURCE CONTROL PROGRAMS

The following descriptions of significant developments in point source control programs are indications of the progress being made to control pollution from known major sources. The progress reported here represents accomplishments that resulted from intensive efforts sometimes extending over many years.

RESERVE MINING

On March 16, 1980, Reserve Mining Company halted the dumping of asbestos-laden ore tailings into Silver Bay, Minnesota, Lake Superior. The Company's action in response to a May 26, 1977 United States Federal Court Order ended the dumping of some 67,000 tons daily of tailings into Lake Superior over a 25-year period. The Company was also ordered to stop emitting asbestos fibers into the atmosphere and to pay more than $1 million in fines and penalties.

Remedial programs include an on-land disposal system to manage both coarse and fine particles. Construction of a 5.8 square mile basin capable of holding 823 million tons of tailings has been completed. The $370 million (estimated) on-land disposal system was put into operation on June 24, 1980. Tailings will be pumped in a water slurry to the basin with closed-loop recycle of water. The basin will be kept flooded to prevent off-site migration of asbestos fibers. Air and water sampling programs in and around Silver Bay will continue under surveillance of the Minnesota Pollution Control Agency to monitor for adverse environmental effects from the new system.

Reserve Mining has also installed electrostatic precipitators at its ore processing plant in Silver Bay to remove asbestos fibers from the plant's air emissions. Measures to control the migration of asbestos from a tailings delta that extends into the lake have been initiated. A rock wall has been built that will eventually form a subsurface breakwater that will close off the tailings delta, preventing fibers from migrating any further.

DETROIT

The Detroit Metropolitan Wastewater Treatment Plant is the largest in the Great Lakes Basin. The wastewaters of over 3 million people have been discharged to the Detroit River with only primary treatment because of construction delays in the secondary treatment system.

In 1977, a Federal Court action brought by the United States EPA and the State of Michigan identified the problems with the Detroit wastewater treatment facility. The result of this action was a Consent Judgment which outlined the specific deficiencies affecting the adequate operation of the water pollution control facility. Specific dates for compliance in each area were specified in the Consent Judgment.

At the request of the Federal Court, a full-scale evaluation of the Detroit wastewater treatment plant was conducted from August 1 to October 26, 1979. The plant was operated as an activated secondary wastewater treatment system producing an effluent quality in compliance with current effluent limitations but at a flow substantially lower than average flow and well below design flow. The limitations which were to take effect on December 31, 1979 were also met with the exception of total suspended solids concentrations and a minor deviation in oil and grease concentration. This represents the first time the Detroit wastewater treatment plant was operated as a full-scale secondary treatment facility since its construction in 1940.

Significant improvements in effluent quality have been documented. Total phosphorus concentrations in Detroit's effluent averaged 1.7 mg/L from July 1979 to June 1980. This is a significant decrease when compared to the effluent concentration reported in 1963 of 11.9 mg/L. When expressed as a loading, this represents an 88 percent decrease in the amount of total phosphorus discharged to the Detroit River since 1963.

The Detroit wastewater treatment plant is not expected to operate continuously as a secondary treatment facility until construction and modification of secondary settling tanks are completed in June of 1981.

SYRACUSE METROPOLITAN SEWAGE TREATMENT PLANT

The Metropolitan Syracuse Sewage Treatment Plant, a major wastewater treatment facility in Onondaga County, New York, serves a population of 344,000.

The original facility was completed in 1960 and secondary treatment with phosphorus removal was completed in the spring of 1970. The secondary treatment processes are operating well with the exception of phosphorus removal. Phosphorus removal will begin in mid-1980 upon completion of the facilities needed to transmit lime waste from the Allied Chemical waste beds to the plant. Phase I work of the pretreatment program will be completed by Dec. 30, 1980.

LOVE CANAL, NEW YORK

The Love Canal is a rectangular, 16-acre, below-ground-level former landfill located in the southeast corner of the City of Niagara Falls, about one-quarter mile north of the Niagara River. It was excavated as part of a proposed canal in the 1890's and subsequently used as a dump site for chemical wastes by Hooker Chemical Company and others over a period of 20 to 30 years. Wastes include such chemicals as benzene, toluene, lindane, trichloroethylene, carbon tetrachloride and a significant amount of trichlorophenol.

Water infiltration into the Canal has caused material to leach out of the waste into surrounding area of primarily single family houses. Some migration has also occurred into the storm sewer system in the residential neighborhood surrounding the Canal and into Black and Cayuga creeks on the northern end. The storm sewer system is in two sections. The northern section drains into Black, Bergholtz, and Cayuga creeks and thence into the Niagara River. The southern section drains directly into the Niagara River. Dioxin (2,3,7,8-isomer) has been detected in a leachate sample taken from the Canal as well as in sediments and biota in Black and Bergholtz creeks to the north and sediments in the storm sewers in the vicinity of the southern part of the Canal.

A leachate collection trench has been constructed during the past two years to completely ring the Canal and intercept outward migrating leachate. The leachate collected is treated on-site by a granular-activated carbon unit before discharge into the City of Niagara Falls sanitary sewer system. The treatment unit operates 3 days a week and treats about 20,000 gallons per day. The top of the landfill has been capped with clay to reduce water infiltration.

New York State is seeking funds under Section 311 of the Clean Water Act for cleanup of contaminated material that has escaped from the Canal and now lies attached to sediment in the stormwater sewer system both in the northern and southern sections of the Canal as well as in Black and Bergholtz creeks to the north. This material is outside the leachate collection trench and hence is capable of further migration.

EPA has begun a comprehensive air, soil and groundwater monitoring program in the Love Canal area.

CITY OF NIAGARA FALLS, NEW YORK

The City of Niagara Falls STP was first started in April 1977. The carbon beds were used on a limited basis beginning in January 1978, stopped in March 1978, and began again in April 1978. In early summer 1978, structural failures were discovered. The plant experienced a rupture of several carbon bed bottoms and after removing the carbon, extensive corrosion and damage to the precast filter bottoms and gullet wall projections was discovered. The operation of the carbon filter beds was suspended and the plant has been providing only primary treatment since that time. This treatment level is not adequate for the industrial and municipal wastes being discharged to the Niagara River from this plant.

A project was approved by the United States EPA on April 24, 1980 for remedial work on the carbon beds which required the City to hire an independent consultant to conduct a review of its 48 MGD wastewater treatment system. The study is expected to be underway in September 1980 and completed in 28 weeks.

STELCO HILTON WORKS, HAMILTON, ONTARIO

Since 1970, the company has undertaken the following major projects to reduce water discharge loadings. By-product plant wastewaters, together with sanitary wastes, were diverted to the Hamilton Sewage Treatment Plant to reduce BOD_5, ammonia, phenols and to eliminate bacteriological contamination. Additional thickeners at the blast furnace were installed and later modified with recycle systems to reduce cyanide and suspended solids. A major filtration plant has been installed in two phases to reduce suspended solids and iron discharges. Other control facilities consist of the construction of a waste oil treatment plant for all discharges or ion exchange plant for chrome discharges and an acid regeneration plant. The Ontario Ministry of the Environment expects to publish its assessment of the effectiveness of these controls in 1981.

DOFASCO, HAMILTON, ONTARIO

During the period 1970-1980, reduction of wastewater pollution to the harbour from Dofasco has been achieved by the following projects. Ammonia stripping sewers and a biological treatment plant were constructed to remove ammonia and phenols from by-product wastewaters. Suspended solids were reduced from blast furnaces by construction of a new thickener system. A new thickener system was also installed to improve suspended solids removal from the melt shop gas washwater. A filtration plant was installed to treat hot mill wastewaters to reduce suspended solids and iron. Other facilities include an acid regeneration plant, oil treatment plant and ion exchange plant.

STELCO - LAKE ERIE DEVELOPMENT

At Stelco's new Lake Erie Development, 90% of the water used is recirculated. The blowdown from the various recirculating systems in the mill, such as blast furnaces and steelmaking facilities, is treated by the alkaline breakpoint chlorination method of chemical oxidation (blowdown treatment plant). When the coke ovens are placed in operation, wastewaters will be pre-treated in a biological treatment plant before discharge to the blowdown treatment plant. The effluent from the blowdown treatment plant is held in a lagoon prior to discharge to Lake Erie. Stormwater is separated and sent to settling ponds before discharge. These programs are expected to comply with Water Quality Agreement Objectives and Ontario requirements.

ALGOMA STEEL CORPORATION, SAULT STE. MARIE, ONTARIO

The major pollution abatement achievement at Algoma Steel over the past ten years has been the construction of the "coke ovens by-products" plant as a result of which the following reductions in loadings have occurred:

	FROM	TO
Phenols	2000 ppb	400 ppb
NH_3	33 ppm	11 ppm
H_2S	12 ppm	3 ppm
HCN	7 ppm	2 ppm

The Ministry of the Environment is currently negotiating a new Control Order for further abatement of pollutants.

SCA CHEMICAL WASTE SERVICES, INC.

SCA Chemical Waste Services, Inc. operates an industrial waste management facility at Model City in the towns of Porter and Lewiston, Niagara County, New York.

The Company requested modification of an existing New York State discharge permit to increase the discharge from a maximum of .1 MGD to a maximum of ? MGD and changes in discharge parameters and monitoring requirements for discharge to the Niagara River and Six Mile Swale (tributary to Lake Ontario). They also requested a permit for construction of an outfall for discharge of treated effluent to the Niagara River and approval of plans for a pipeline from Model City to the Niagara River.

It was determined that an adjudicatory hearing would be held in two phases, the first phase concentrating on the permit modifications and the discharge to Niagara River because of the known accumulation of 86,000,000 gallons of treated effluent and the long term need for discharge of treated leachate from existing landfill facilities. The second phase would review all remaining matters.

The New York State Department of Environmental Conservation (NYSDEC) determined that the project may have adverse environmental effects attributable to improper treatment or storage of hazardous industrial waste. The

Draft Environmental Impact Statement concluded, however, that all significant adverse impacts on the environment could be satisfactorily controlled. The NYSDEC also determined that the discharge modifications would not have a significant effect on the environment.

Phase I hearings began June 25, 1979 and included testimony from NYSDEC and the company. A substantial part of the hearing focussed on the proposed discharge into a portion of the Niagara River known as Peggy's Eddy, about 3 miles from Lake Ontario.

The objectors included the Town of Porter, Operation Clean and many individual citizens from both the United States and Canada. Interest in the hearing was high with 50 to 100 persons attending each session.

In February 1980, the State of New York issued a permit along with approval to construct a pipeline. Several lawsuits from the Town of Porter followed. The town also refused to issue a permit for the SCA to excavate. The Company then sued the town for issuance of the permit. The United States Corps of Engineers recently issued a permit to construct the outfall structure in the Niagara River. This permit takes effect only after all local permits are issued.

SCA Chemical Waste Services, Inc. has purchased pipeline materials and some vandalism has occurred. Citizens are disrupting construction by their physical presence. The NYSDEC estimates that it will take at least one year to resolve the various lawsuits.

HOOKER CHEMICALS AND PLASTICS

The Hooker Chemical and Plastics Company owns and operates a chemical manufacturing facility in the City of Niagara Falls, New York, located along the Niagara River. The Company is authorized by an SPDES permit to discharge treated process wastewater and cooling water through five outfalls to the Niagara River. These outfalls also contain some storm drainage from the plant site. Monitoring reports indicate a total daily average flowrate from all five outfalls of 30 to 50 million gallons per day (MGD).

Under the terms of its permit, Hooker is required to monitor its effluents monthly for nineteen specific organic chemicals. Hooker is also required to monitor its effluents for the pesticide "mirex", twice per year. A two-day monitoring program for PCBs and trichlorotoluene was also required by the permit.

The State of New York determined that the discharge proposed would not cause a violation of present water quality standards for the Niagara River or endanger public water supplies.

As required by its permit which will expire on March 31, 1981, Hooker has completed a study, identifying the sources of potentially toxic pollutants, contained in the discharge and is required to submit an engineering report on the major sources, including contaminated groundwaters at the plant site. This report is to recommended a plan of remedial action. These studies will

serve as one basis for identifying "Best Available Technology Economically Achievable (BAT)". The renewal permit will require that BAT effluent limitations for toxic pollutants be achieved not later than July 1, 1984, as mandated by the Clean Water Act.

ST. CLAIR RIVER

A water quality study was recently completed by the Ontario Ministry of the Environment comparing 1977 water quality information with similar information obtained in 1968. Significant improvements in river quality have occurred between the two studies. They are attributed to upgrading of existing treatment systems and the building of new facilities in the Sarnia- Lambton area. Further improvements in water quality are expected.

In the late 60's and early 70's, control of oil and suspended solids was accomplished by separation of waste streams and the installation of dual-media filtration systems.

Attention was then directed to the reduction of dissolved organic material. Five biological oxidation units have been completed, resulting in a substantial reduction in total organic carbon, phenols and BOD; the sixth is scheduled for completion in 1982. Granular activated carbon removes other organic materials to overcome problems of fish toxicity in the St. Clair River. Accidental discharges of contaminants are minimized by construction of contingency ponds in the effluent system and the addition of special loading equipment on the docks.

Advanced analytical equipment capable of measuring in the parts per trillion range is used in both the waste and process systems to improve waste discharge control and reduce the number of process upsets.

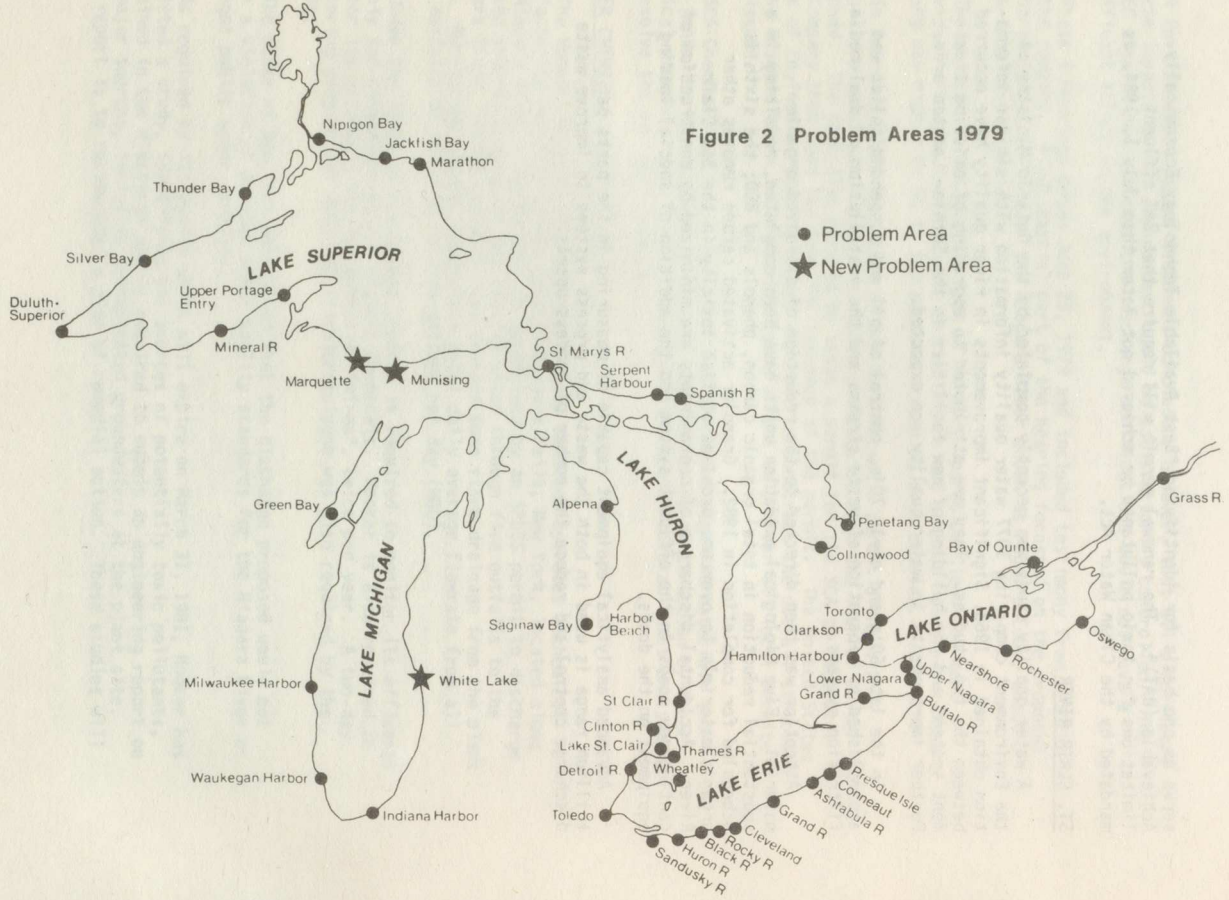

Figure 2 Problem Areas 1979

TABLE 5

REPORTED MUNICIPAL PHOSPHORUS LOADS IN THE LOWER LAKES BASIN[1]

(Kilograms/Day)

LAKE BASIN	1972 LOAD ESTIMATE	PHOSPHORUS LOADINGS						
		1975	1976	1977	1978	1979	LOAD AT 1 mg/L[2]	LOAD OVER 1 mg/L[3]
ONTARIO[4]								
United States	13,000	5,000	4,210	6,149	4,297	3,965	1,906	2,059
Canada	14,000	6,780	3,620	3,130	2,935	3,315	2,558	757
ERIE								
United States	38,000	21,180	17,880	17,827	15,380	11,294	6,302	4,992
Canada	3,800	600	690	686	607	585	641	-

[1]Phosphorus loadings for 1975, 1976, 1977, 1978 and 1979 as reported for sewage treatment plants over 3,800 m^3/d (1 MGD).

[2]Target loading with all municipalities at 1.0 mg/L "P" based on 1979 flow.

[3]Excess - loading for 1979 minus calculated loading if effluent concentration were 1 mg/L.

[4]Including St. Lawrence River.

NOTE: Loadings reflect the number of plants reporting each year. Specific year-to-year comparisons are not advisable.

TABLE 6

MUNICIPAL PLANTS IN THE LOWER LAKES OVER 38,000 m^3/d (10 MGD), 1979 FLOW

MUNICIPAL PLANTS	REPORTED PHOSPHORUS LOADS (kg/d) 1979	LOAD AT 1 mg/L (kg/d) 1979	AVERAGE ANNUAL EFFLUENT PHOSPHORUS CONCENTRATION 1979
LAKE ONTARIO			
United States:			
Buffalo	1,741	645	2.7
Syracuse	569	196	2.9
Rochester			
Frank Van Lare	568	568	1.0
Gates-Chili-Ogden	55	36	1.5
Northwest Quadrant	44	44	1.0
Niagara Falls	530	227	2.4
Tonawanda S.D.#2	48	84	0.6
Auburn	-	-	-
Lockport	25	0.5	0.5
Canada:			
Toronto			
Main	633	763	0.8
Humber	383	383	1.0
Highland Creek	116	138	0.8
North Toronto	36	40	0.9
Hamilton	803	251	3.2
Lakeview-Mississauga	221	170	1.3
Kingston	55	57	1.0
Burlington Skyway	74	78	1.0
Cornwall	121	49	2.5
Peterborough	73	49	1.5
Oshawa	121	55	2.2
Belleville	21	30	0.7
Niagara Falls	44	44	1.0

* Estimated.

Table 6 - cont'd

MUNICIPAL PLANTS	REPORTED PHOSPHORUS LOADS (kg/d) 1979	LOAD AT 1 mg/L (kg/d) 1979	AVERAGE ANNUAL EFFLUENT PHOSPHORUS CONCENTRATION 1979
LAKE ERIE			
United States:			
Detroit	4,206	2,461	1.7
Wyandotte	294	256	1.2
Warren	82	101	0.8
Pontiac	11	62	0.2
Ann Arbor	39	66	0.5
Port Huron	42	42	1.0
Monroe	13	46	0.3
Cleveland			
Easterly	271	475	0.6
Southerly	1,064	376	2.8
Westerly	673	145	4.6
Toledo	317	352	0.9
Akron	639	340	1.9
Euclid	525	110	4.8
Lima	66	81	0.8
Lorain	158	62	2.6
Lakewood	28	42	0.7
Sandusky	84	42	2.0
Erie	360	237	1.5
Fort Wayne	63	132	0.5
Canada:			
Windsor Westerly	90	97	0.9
London Greenway	101	107	0.9
Kitchener	43	61	0.7
Guelph	9	9	1.0
Brantford	33	40	0.8
Sarnia	53	41	1.3

TABLE 7

MAJOR MUNICIPAL POINT SOURCES IN THE LOWER LAKES BASIN
EXCEEDING THE 1 MG/L PHOSPHORUS TARGET

FACILITY	JURISDICTION	BASIN	FLOW ($10^3 m^3/d$)	P LOAD (kg/d)	P CONC. (mg/L)	LOAD OVER 1 mg/L (kg/d)	COMPLIANCE DATE
Detroit STP	Michigan	Erie	2,488	4,281	1.7	1,792	1981
Buffalo S.A. STP	New York	Ontario	644	1,741	2.7	1,096	1982
Cleveland Southerly STP	Ohio	Erie	375	1,063	2.8	687	1984
Hamilton STP	Ontario	Ontario	251	603	3.2	552	1980
Cleveland Westerly STP	Ohio	Erie	145	672	4.6	527	1982
Euclid STP	Ohio	Erie	110	524	4.8	414	1986
Medina County STP 200	Ohio	Erie	57	470	7.9	410	To be abandoned
Syracuse Metro STP	New York	Ontario	193	569	3.0	376	1981
Niagara Falls STP	New York	Ontario	220	530	2.4	309	1982
Akron STP	Ohio	Erie	339	638	1.9	298	1985

TABLE 8

MUNICIPAL PLANTS IN THE UPPER LAKES OVER 38,000 m^3/d (10 MGD), 1979 FLOW

MUNICIPAL PLANTS	REPORTED PHOSPHORUS LOADS (kg/d) 1979	LOAD AT 1 mg/L (kg/d) 1979	AVERAGE ANNUAL EFFLUENT PHOSPHORUS CONCENTRATION 1979
LAKE SUPERIOR			
United States:			
West Lake Superior S.D.	77	128.7	0.6
Canada:			
Thunder Bay STP	320	85.9	3.7
LAKE MICHIGAN			
United States:			
East Chicago STP	82	61.4	1.3
Gary STP	242	162.9	1.5
Hammond STP	109	143.9	0.8
South Bend STP	43	159.6	0.3
Mishawaka STP	11	42	0.3
Elkhart STP	38	56.2	0.7
Battle Creek STP	81	46.6	1.8
East Lansing STP	31	38.2	0.8
Jackson STP	39	51.1	0.8
Kalamazoo STP	281	128.2	2.2
Wyoming STP	160	50.0	3.2
Grand Rapids STP	561	198.0	2.9
Appleton STP	5.6	59.5	0.9
Milwaukee Jones Island	206	515	0.4
Milwaukee South Shore	219	317.4	0.7
Racine STP	92	99.7	0.9
Sheboygan STP	112	38.1	2.9
Neenah-Menasha	23	38.2	0.6
Kenosha STP	64	74.7	0.9
Muskegon	8.3	121.6	0.06
LAKE HURON			
United States:			
Bay City STP	17	42.5	0.4
Flint STP	173	75.2	2.3
Sault Ste. Marie STP	30	13.6	2.3
Canada:			
Sault Ste. Marie STP	152	54.1	2.8
Sudbury STP	93	54.9	1.7

*Estimated.

TABLE 11

COMPLETION DATES IN THE 1978 GREAT LAKES WATER QUALITY AGREEMENT

ARTICLE OR ANNEX
ARTICLE IV - SPECIFIC OBJECTIVES Section 1 (e) The Parties recognize that in certain areas of inshore waters natural phenomena exist which, despite the best efforts of the Parties, will prevent the achievement of some of the Specific Objectives. As early as possible, these areas should be identified explicitly by the appropriate jurisdictions and reported to the International Joint Commission.
ARTICLE VI - PROGRAMS AND OTHER MEASURES Section 1 (a) Pollution from Municipal Sources. Programs for the abatement, control and prevention of municipal discharges and urban drainage into the Great Lakes System. These programs shall be completed and in operation as soon as practicable, and in the case of municipal sewage treatment facilities no later than December 31, 1982. Section 1 (b) Pollution from Industrial Sources. Programs for the abatement, control and prevention of pollution from industrial sources entering the Great Lakes System. These programs shall be completed and in operation as soon as practicable and in any case no later than December 31, 1983. Section 1 (c) Inventory of Pollution Abatement Requirements. Preparation of an inventory of pollution abatement requirements for all municipal and industrial facilities discharging into the Great Lakes System in order to gauge progress toward the earliest practicable completion and operation of the programs listed in sub-paragraphs (a) and (b) above. This inventory, prepared and revised annually, shall include compliance schedules and status of compliance with monitoring and effluent restrictions, and shall be made available to the International Joint Commission and to the public. In the initial preparation of this inventory, priority shall be given to the problem areas previously identified by the Water Quality Board.

PROGRESS TOWARD MEETING COMPLETION DATES
SPECIFIED IN 1978 AGREEMENT

There have been no areas in this category reported to the IJC.

Programs are underway in both U.S. and Canada to control municipal and industrial point sources.

The Parties have not prepared inventories for submission to the International Joint Commission.

Table 11 - cont'd.

ARTICLE OR ANNEX
ARTICLE VII - POWERS, RESPONSIBILITIES AND FUNCTIONS OF THE INTERNATIONAL JOINT COMMISSION Section 3 The Commission shall make a full report to the Parties and to the State and Provincial Governments no less frequently than biennially concerning progress toward the achievement of the General and Specific Objectives including, as appropriate, matters related to Annexes to this Agreement. This report shall include an assessment of the effectiveness of the programs and other measures undertaken pursuant to this Agreement, and advice and recommendations. In alternate years the Commission may at any time make special reports to the Parties, to the State and Provincial Governments and to the public concerning any problem of water quality in the Great Lakes System. ANNEX 2 - LIMITED USE ZONES Section 1 The Parties, in consultation with the State and Provincial Governments, shall take measures to define and describe all existing and future limited use zones, and shall prepare an annual report on these measures. Section 2 Limited use zones within the boundary waters of the Great Lakes System shall be designated for industrial discharges, and for municipal discharges in excess of 1 million gallons per day before January 1, 1980. ANNEX 3 - CONTROL OF PHOSPHORUS Section 3 The Parties, in cooperation with the State and Provincial Governments, shall within eighteen months after the date of entry into force of this Agreement confirm the future phosphorus loads, and based on these establish load allocations and compliance schedules, taking into account the recommendations of the International Joint Commission arising from the Pollution from Land Use Activities Reference. Until such loading allocations and compliance schedules are established, the Parties agree to maintain the programs and other measures specified in Annex 2 of the Great Lakes Water Quality Agreement of 1972.

PROGRESS TOWARD MEETING COMPLETION DATES
SPECIFIED IN 1978 AGREEMENT

The Water Quality Board and the Science Advisory Board are preparing reports to the IJC which may be used as supporting and advisory information for both biennial and alternate year reports to the Governments.

The Parties have not submitted information on Limited Use Zones.

Consultations have been initiated between the Governments but have not yet been completed. The Phosphorus Management Strategies Task Force completed a report on phosphorus loadings and control in July 1980 which will be used as reference information in the allocation procedures.

In September 1980, the Parties extended the timetable for their confirmation of loadings and schedules for the upper and lower lakes until May 1981.

Table 11 - cont'd.

ARTICLE OR ANNEX
ANNEX 6 - REVIEW OF POLLUTION FROM SHIPPING SOURCES Section 2 Consultation. Representatives of the Canadian Coast Guard and the United States Coast Guard, and other interested agencies, shall meet at least annually to consider this Annex. A report of this annual consultation shall be furnished to the International Joint Commission prior to its annual meeting on Great Lakes water quality.
ANNEX 7 - DREDGING Section 1 (a) Review the existing practices in both countries relating to dredging activities, as well as the previous work done by the International Working Group on Dredging, with the objective of developing, within one year of the date of entry into force of this Agreement, compatible guidelines and criteria for dredging activities in the boundary waters of the Great Lakes System.
ANNEX 8 - DISCHARGES FROM ONSHORE AND OFFSHORE FACILITIES Section 4 (a) Each Party shall submit a report to the International Joint Commission outlining its programs and measures, existing or proposed, for the implementation of this Annex within six months of the date of entry into force of this Agreement.
ANNEX 12 - PERSISTENT TOXIC SUBSTANCES Section 3 Programs. The Parties, in cooperation with the State and Provincial Governments, shall develop and adopt the following programs and measures for the elimination of discharges of persistent toxic substances: Section 3 (a) Identification of raw materials, processes, products, by-products, waste sources and emissions involving persistent toxic substances, and quantitative data on the substances, together with recommendations on handling, use and disposition. Every effort shall be made to complete this inventory by January, 1982. Section 3 (c) Joint programs for disposal of hazardous materials to ensure that these materials such as pesticides, contaminated petroleum products, contaminated sludge and dredge spoils and industrial wastes are properly transported and disposed of. Every effort shall be made to implement these programs by 1980.

PROGRESS TOWARD MEETING COMPLETION DATES
SPECIFIED IN 1978 AGREEMENT

The Canadian and U.S. Coast Guards and other interested agencies met in July 1979 and July 1980. Reports of each meeting were forwarded to the IJC.

The Dredging Subcommittee, established in December 1978, completed its report on criteria and guidelines in Nov. 1979 which was forwarded to the IJC by the Water Quality Board. The Subcommittee is currently preparing a register of major dredging projects in the Great Lakes.

To date, there has been no specific report to IJC from the Parties on programs for implementation of this Annex. Currently, both U.S. and Canada are preparing reports on this Annex.

The programs under Annex 12 are under development.